C. BENCHMARK ANALYSIS

1. Purpose of Benchmark Analysis

In the analysis process, resource supply potentials were determined by establishing the maximum production potential through FORPLAN computer analysis called benchmarks. Economic benchmarks were also developed as a point of reference to measure the costs and effects of applying Forest Service regulations and policies. These benchmarks serve as references from which to evaluate the costs and effects of various land management objectives

The benchmark analysis enabled the Forest to.

- Estimate the schedule of management activities, resource outputs, effects, discounted benefits and costs, Present Net Value, and acreages of prescription assignments needed to achieve the purpose of the benchmarks;

- Define resource production levels associated with maximizing single resource outputs,

- Analyze the implications of land management laws and policies, including Management Requirements of 36 CFR 219.27,

  Analyze the potential to resolve issues and concerns,

- Analyze the current and expected future level of goods and services if current management is continued,

- Analyze the need to change management direction;

- Define the range within which alternatives could be formulated

After public comments were received on the Draft Environmental Impact Statement, the FORPLAN model was reconstructed as described in Section III The alternatives were re-run but the benchmarks were not Only technical and legislative changes would have affected the benchmark results, and it is estimated that the timber outputs (ASQ) would be approximately 3-4% less because of these. This difference is not considered significant with respect to the comparison between benchmarks, so that they remain suitable for this purpose

The following sections describe the benchmarks which were developed to define the production potentials and economic relationships of Forest resources

2. Benchmark 1 Maximum Timber

a Description

This benchmark estimates the maximum biological potential timber volume that can be produced on the Forest on a sustained yield basis, subject to rotation age restrictions and nondeclining yield

b Purpose

The purpose of developing this benchmark is to determine the maximum level of timber volume which could be produced subject to the harvest flow constraints stated above.

c. FORPLAN Objective Function

Initially, timber production is maximized in the first decade The first decade volume is then "locked in," and the case is re-run to maximize timber production over the 150-year horizon The volume figures for the first and fifteenth decades are then "locked in" and the case is re-run again to maximize Present Net Value to select the most efficient set of practices which maximize timber production

d. Assumptions and Constraints

Timber harvest is scheduled only on lands classified as "suitable" through the suitability analysis.

Management requirements are not constraints

Nondeclining flow at or below long-run sustained yield capacity.

Rotations based on 95 percent of culmination of mean annual increment.

Ending inventory constraint applied

All constraints are applicable throughout the planning horizon (150 years).

e. Timber

This benchmark run produced a long-term sustained yield capacity of 68 8 million cubic feet per year with a first decade harvest volume of 59 2 million cubic feet per year (326.6 million board feet per year) This includes approximately 4.3 million cubic feet per year (13 0 million board feet per year) of mortality salvage and nonchargeable timber volume. This total volume will exceed the volume production goals for the Malheur National Forest called for in the "Forestry Program for Oregon" in all five decades See Table B-15 for volume of timber harvest by decade

The species mix for the first decade is approximately 60 percent ponderosa pine and 40 percent mixed conifer species. This gradually shifts to 76 percent mixed conifer species and 24 percent ponderosa pine by Decade 5. See Figure B-2 for the harvest methods used to achieve these volumes by decades. In addition, there is an average forest residue potential of 47.1 million cubic feet per year produced over the planning period (See Figure B-3.)

To achieve the projected harvest volumes, there will be an increase in precommercial thinning and planting acres over the 50-year period. General trends indicate high levels of precommercial thinning in the first three decades with a significant decrease in the last two decades A significant increase in reforestation (planting) acres occurs in the last two decades of the planning period. See Figures B-4 and B-5 for precommercial thinning and planting acres

FIGURE B-2
HARVEST METHODS

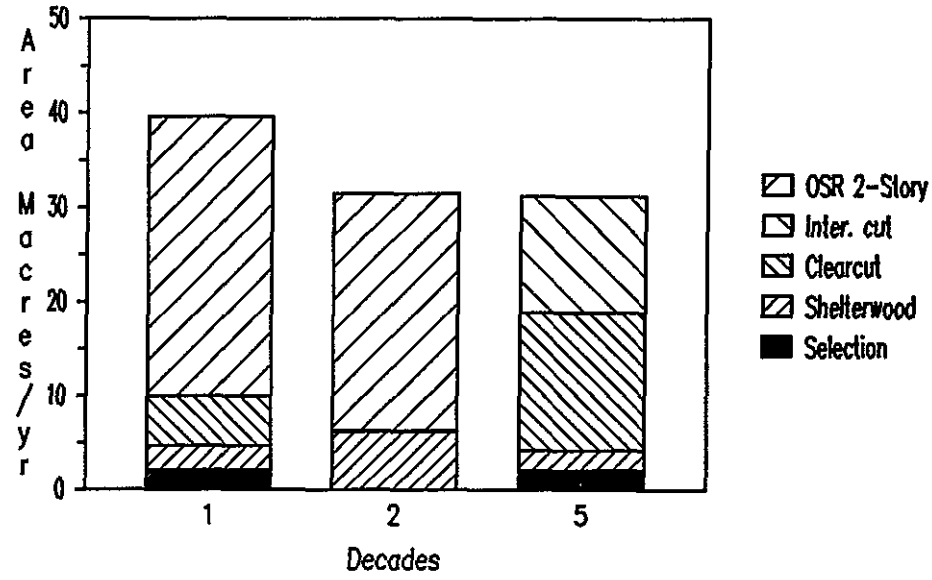


FIGURE B-3
OTHER WOOD FIBER AND PERSONAL USE FIREWOOD

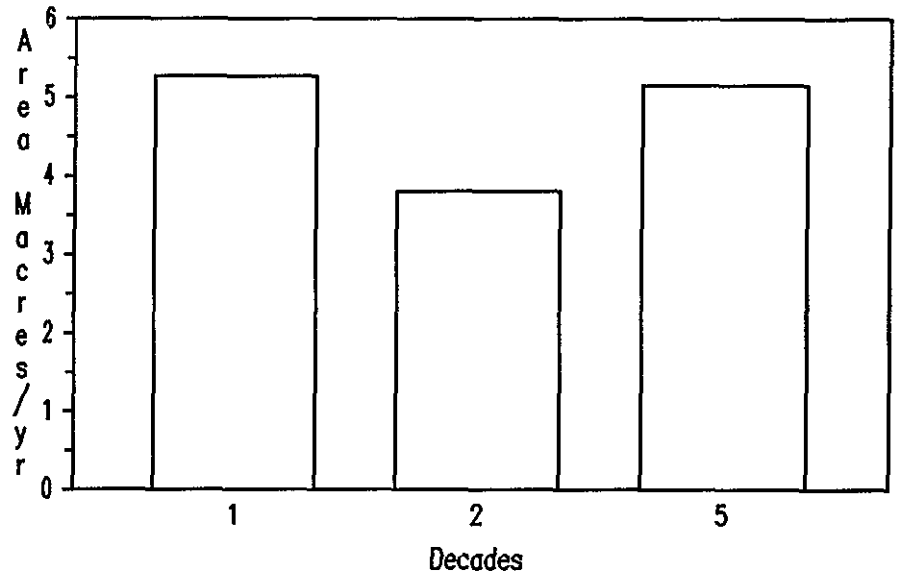


FIGURE B-4
PRECOMMERCIAL THINNING

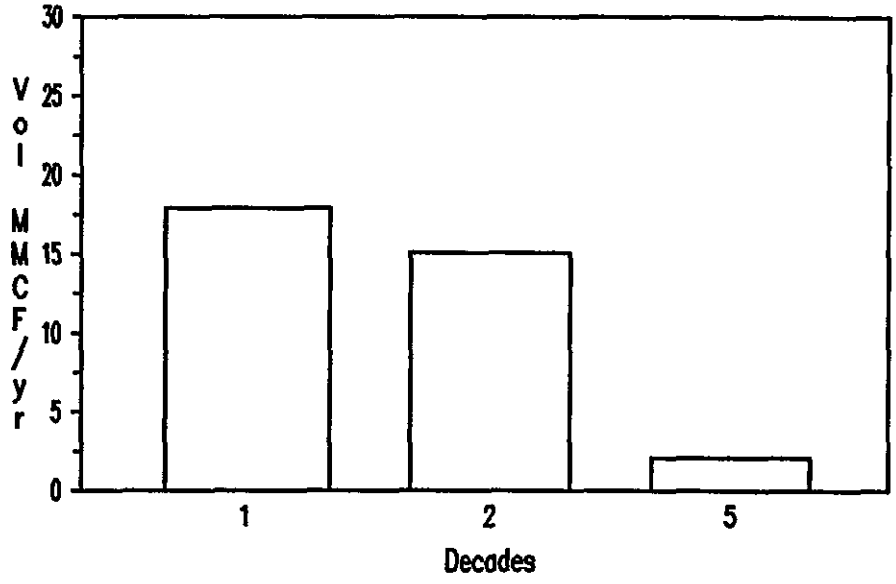
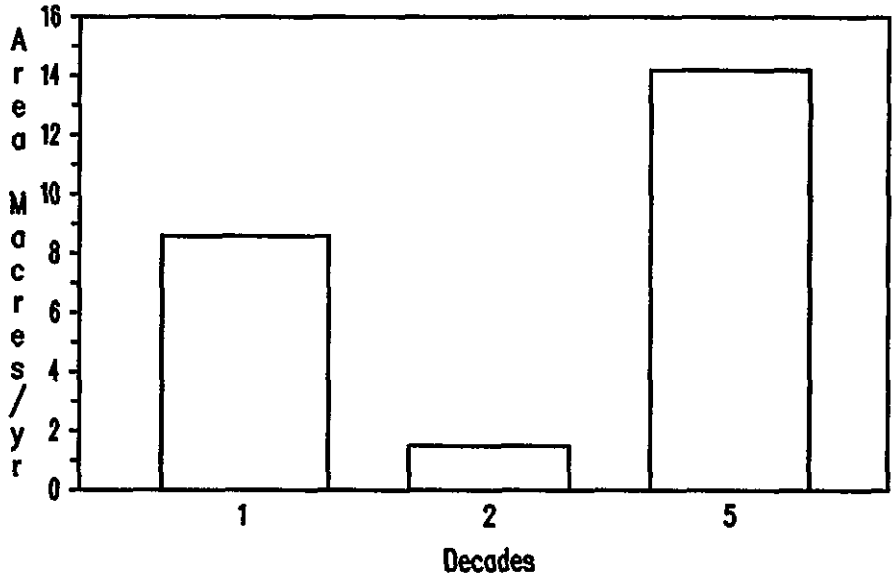


FIGURE B-5
REFORESTATION (PLANTING)



f. Range Management — On Forested land an increase in animal unit months occurs in Decade 2 then remains level through Decade 5 On nonforested lands, the animal unit months remain level through Decade 2 and the level then decreases slightly through Decade 5. The overall trend is an increase in Decade 2 followed by a slight decrease. (See Figure B-6.)

g Wildlife — Big-game habitat shows a steady increase toward optimum cover/forage ratios through the fifth decade (Figure B-8). Habitat Effectiveness Indices were not calculated for this analysis Estimated elk numbers (per forage capability) on both summer and winter ranges decrease sharply in Decade 2 Estimated elk numbers on summer range recover slowly, but those on winter range remain constant (Figure B-7). Elk numbers were estimated by forage availability and a discount for less-than-optimum cover conditions only No other factors such as hunting, predation, roading, weather, etc , were used to estimate the hypothetical population capacity of this benchmark.

h Old Growth — Old-growth stands will not exist outside the wildernesses

i. *Fisheries* — *Since harvestable (merchantable) timber in riparian areas is liquidated in the* first decade with regeneration harvest prescriptions, water quality standards for temperature would not be met in many streams. This high level of timber harvest activity near streams, plus the increased rate of road construction, would also increase the probability that water quality standards for turbidity would not be met This would have a substantial adverse effect on fish habitat quality.

Liquidation of the merchantable timber in riparian areas also removes the long-term supply of large woody material to the stream. This results in a loss of pool habitat which is an additional adverse effect on fish habitat.

After the initial harvest and site preparation, there would be little need for operating equipment near the streams until commercial thinning entries begin. Thus, there should be a general recovery of riparian condition through most of the following five decades This should moderate the adverse effects on fish habitat in decades 3 through 5

Livestock grazing on the Forest increases substantially from the current situation However, the animal unit months produced in riparian areas are reduced from the current situation Assuming the large investment to achieve this redistribution of livestock, fish habitat would not be adversely affected A stable trend could be expected as it relates to livestock management With 100 percent control of livestock and maximum administration, an upward trend would be possible.

The decrease in fisheries production potential shown in Table B-15 and Figure B-9 is only an estimate More detail concerning application of best management *practice investment levels for mitigation, and other Forest activities would be* needed to verify this estimate Within the general description of this benchmark, it would be possible to build a scenario where the Forest contribution to the downstream and ocean anadromous fisheries would be negligible.

j Water — See summary analysis, Section VI C.10 d

FIGURE B-6
LIVESTOCK

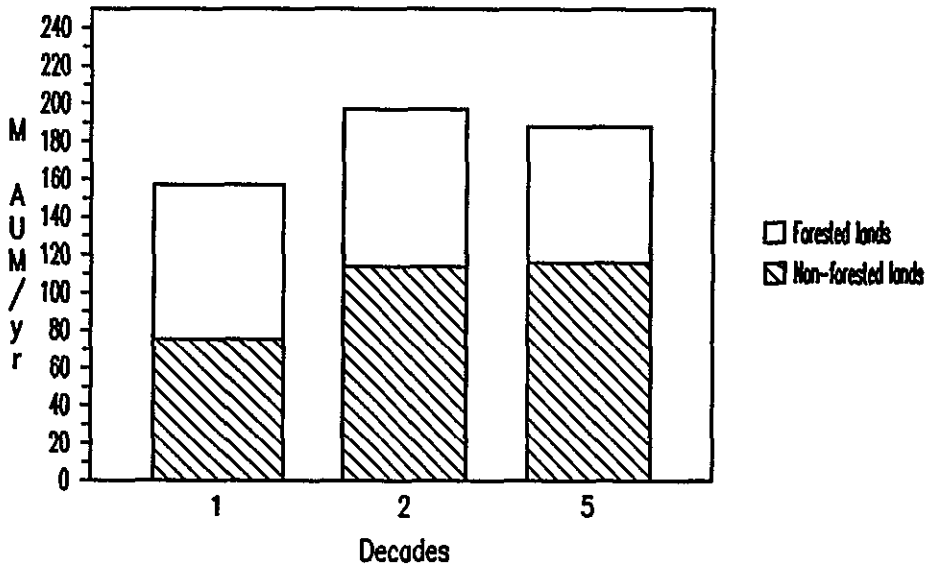


FIGURE B-7
ESTIMATED ELK NUMBERS (per forage availability)

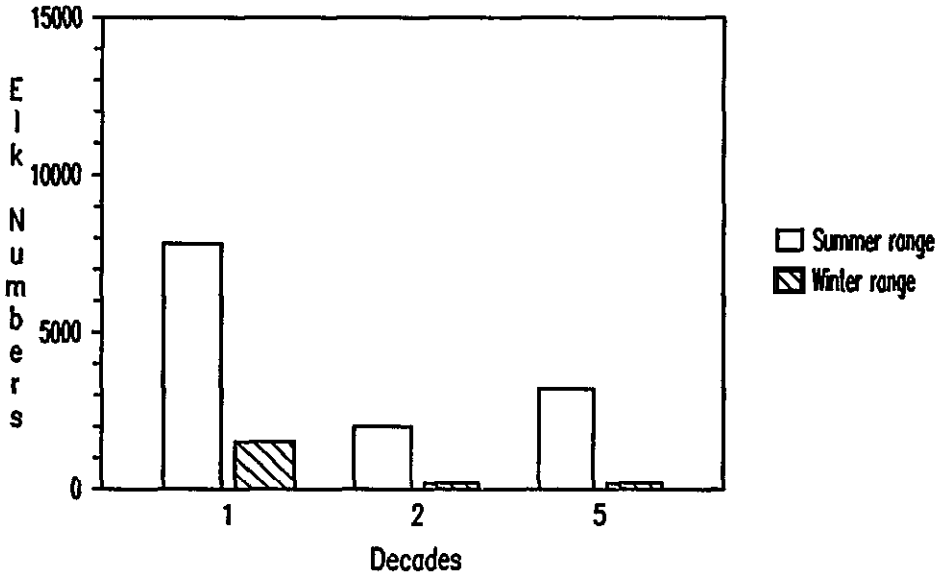
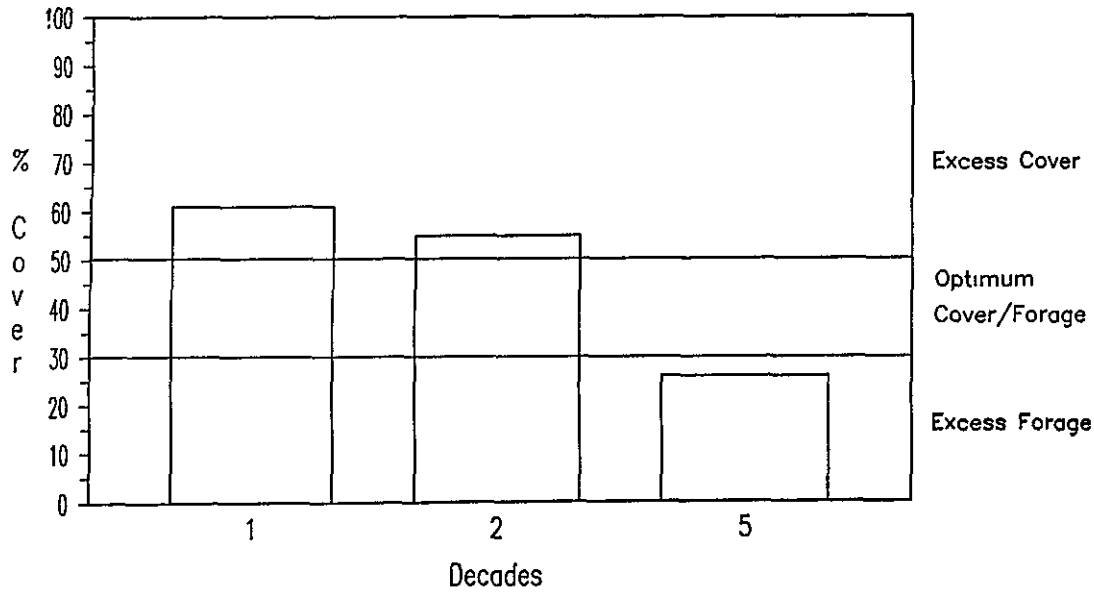
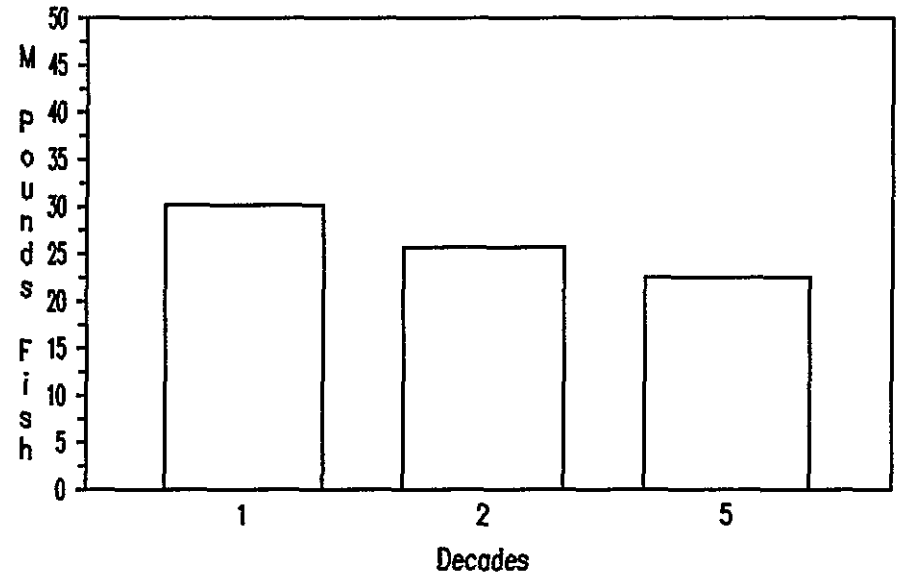


FIGURE B-8
BIG-GAME HABITAT CAPABILITY



Cover in the above figure refers to an undefined combination of satisfactory and marginal cover categories

FIGURE B-9
ANADROMOUS FISH PRODUCTION POTENTIAL



k. Recreation

Developed Recreation: Developed recreation opportunities would not be provided.

Dispersed Recreation: Unroaded dispersed recreation opportunities outside wilderness would be eliminated in the first decade. This benchmark would eventually provide only roaded modified and wilderness recreation opportunities.

Visual Resource: No provisions for visual resource management would be made. By the second decade the only natural-appearing landscapes remaining would be those in wilderness.

Cultural Resource: Cultural resources will be inventoried prior to the implementation of potentially impacting management activities. The number of acres managed for cultural resource values is primarily influenced by the acres of timber to be harvested annually. New acres will accumulate until all lands suitable for timber production have been surveyed and cultural resources located. Thereafter, new cultural resource management acres will continue to accrue as other Forest acres are examined.

l. Transportation

Arterial and collector road construction and reconstruction will remain constant over time. The reason for this is the even dispersion of harvest and recreational activities over the Forest. The indications from the projected outputs of the benchmarks is that this dispersion will continue. This assumption of a constant program also applies to maintenance levels 1, 3, 4, and 5 of the road maintenance program. Since local roads are usually used by only high-clearance vehicles, they fall into maintenance level 2 which will change over time.

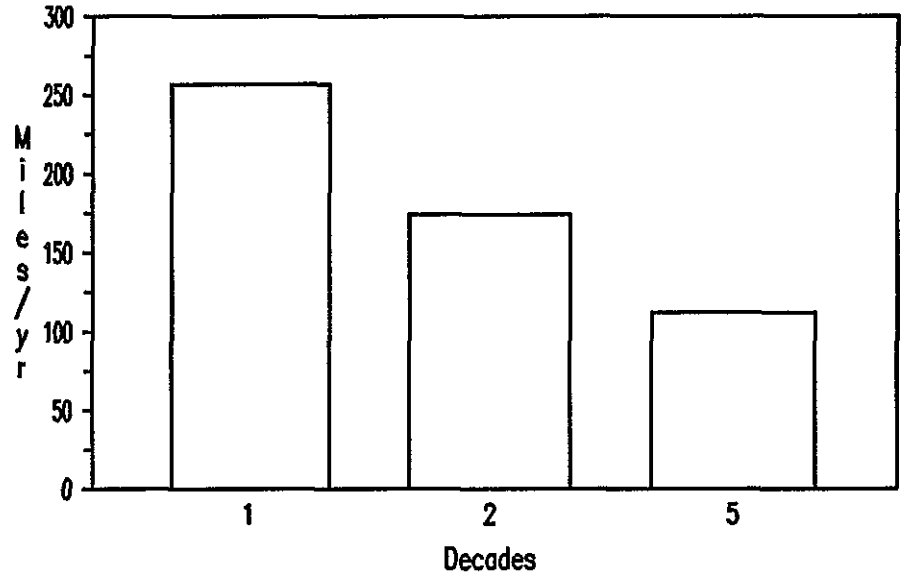
The local road system construction and reconstruction program varies over time. This is shown in Figure B-10. This graph shows a decrease in road construction and reconstruction miles after the first decade.

m. Protection

The cost of protection (dollars per million acres protected) will not vary by benchmark or alternative. Eighteen protection alternatives were run through the Fire Management Analysis process and the most cost-efficient alternative was selected. Differences in benchmarks or alternatives will probably have no measurable effect on the Fire Management Effectiveness level selected.

Method of Measurement: Fire Management Effectiveness is measured by adding appropriated Forest Fire Protection Dollars to Emergency Firefighting costs and resource loss values. Program effectiveness is computed by averaging the annual cost over a decade.

PIGURE B-10
LOCAL ROAD CONSTRUCTION/RECONSTRUCTION



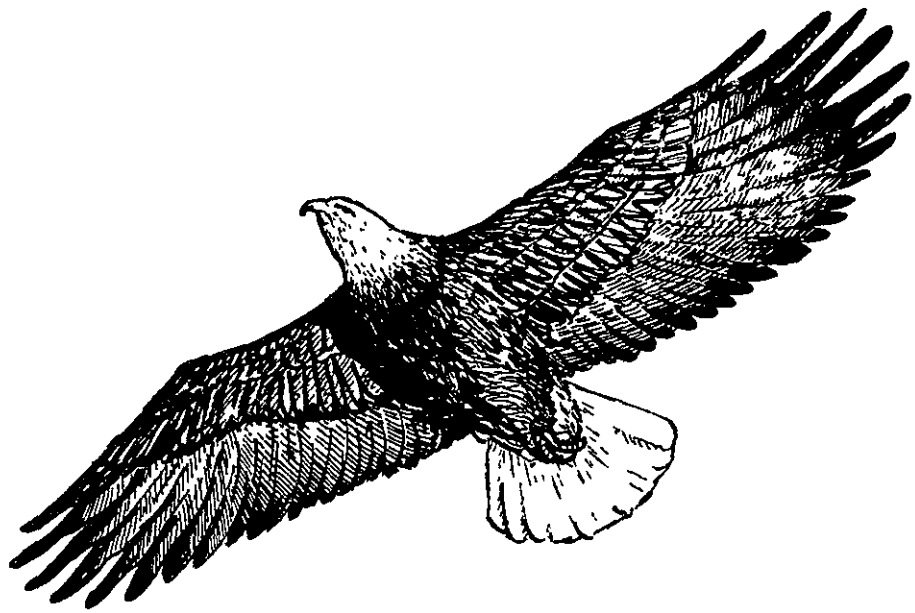


TABLE B-15

BENCHMARK BM1 - MAXIMUM TIMBER

Output/Effect	Unit of Measure/yr	1st Decade	2nd Decade	5th Decade
RECREATION				
Developed Use	M RVDs	0	0	0
Dispersed Use				
Semi-Primitive				
Non-Motorized	M RVDs	0	0	0
Semi-Primitive				
Motorized	M RVDs	157.3	157.3	157.3
Roaded Natural	M RVDs	1949.0	976.1	0
Roaded Modified	M RVDs	1542.0	2633 0	3294.4
Wilderness	M RVDs	61 8	61 8	61.8
WILDLIFE AND FISH				
Elk (Summer)	Numbers	7800	2000	3200
Anadromous Fish	M Pounds	30.2	25.7	22 5
Big-Game Use[1/]	M WFUDs	72 7	47.3	52.6
Fish Use[1/]	M WFUDs	22.3	19.0	16.6
RANGE				
Livestock Use	M AUMs	157 3	197 3	188 2
TIMBER				
LTSYC	MM Cu Ft	---------- 68 8 in Decade 15 --------		
Programmed Sale	MM Bd Ft	326.6	N/A	N/A
Offered[2/]	MM Cu Ft	59.2	59 4	60.1
Other wood fiber and				
Personal firewood	MM Cu Ft	5 27	3 81	5 15
Volume by species				
Ponderosa Pine	MM Cu Ft	32.8	23 1	12.9
Mixed Conifer	MM Cu Ft	21.9	30.4	41.5
Lodgepole Pine	MM Cu Ft	0 2	1 3	0 4
Harvest Method				
Overstory removal/				
Two-story stand	M Acres	29.6	25.2	0
Intermediate cut	M Acres	0	0	12.3
Clearcut	M Acres	5 3	0 1	14 7
Shelterwood cut	M Acres	2 6	6 2	2.1
Selective cut	M Acres	2.1	0	2 1
Precommercial thin	M Acres	17.9	15.1	2.1
Reforestation (Plant)	M Acres	8.6	1.5	14.2
WATER QUALITY				
Sediment	Index	1490	1127	1442
Water Yield	M Acre feet	620	620	620
FIRE				
Fire Effective Index	$/M Acres	1344	1344	1344
Fuel Treatment	M Acres	32.3	25.3	27.5
FACILITIES				
Passenger Car	Miles	1472	1472	1472
High Clearance Vehicle	Miles	6183	6919	7478
Construction and	Miles	257	174	112
Reconstruction				

1/Included in recreation visitor days in recreation

2/Including 4.3 million cubic feet per year salvage.